LOUISIANA SCIENTIST

THE

NEWSLETTER

of the

LOUISIANA ACADEMY OF SCIENCES

Volume 5 Number 1
(2014 Annual Meeting Abstracts)

Published by
THE LOUISIANA ACADEMY OF SCIENCES

31 August 2014

Louisiana Academy of Sciences
Abstracts of Presentations
2014 Annual Meeting

Louisiana State University at Alexandria
Alexandria, Louisiana
08 March 2014

Table of Contents

Division/Section **Page**

Division of Agriculture, Forestry, and Wildlife 4

Division of Biological Sciences 6
- Environmental Sciences Section 6
- Microbiology Section 7
- Molecular and Biomedical Biology Section 11
- Zoology Section 12

Division of Physical Sciences 19
- Chemistry Section 19
- Computer Science Section 24
- Earth Sciences Section 27
- Materials Science and Engineering Section 28
- Physics Section 30

Division of Science Education 34
- Higher Education Section 34

Division of Sciences and Humanities 35

Division of Social Sciences 37

Acknowledgement 39

The following abstracts of oral and poster presentations represent those received by the Abstract Editor. Authors' affiliations are abbreviated as follows:

CPMC	Calcasieu Parish Mosquito Control
GSU	Grambling State University
LC	Louisiana College
LSU-A	Louisiana State University at Alexandria
LSU-AC	LSU Agriculture Center
LSU-BR	Louisiana State University, Baton Rouge
LSU-E	Louisiana State University, Eunice
LTU	Louisiana Tech University
LU-NO	Loyola University, New Orleans
McSU	McNeese State University
NiSU	Nicholls State University
PVAMU	Prairie View A&M University
SLU	Southeastern Louisiana University
SU-BR	Southern University, Baton Rouge
TCU	Texas Christian University
TU	Tulane University
UA	University of Alabama
ULL	University of Louisiana, Lafayette
ULM	University of Louisiana, Monroe
US-A	University of Sydney, Australia
UW-LC	University of Wisconsin—La Crosse
UW-M	University of Wisconsin-Madison

Division of Agriculture, Forestry, and Wildlife

Cole, J.M. and C.A. Corbat. LSU-A. **The relationship between Eastern Woodrat (*Neotoma floridana*) abundance and Eastern Gray Squirrel (*Sciurus carolinensis*) abundance in a bottomland hardwood forest in Central Louisiana.—**The Eastern Woodrat (*Neotoma floridana*) and the Eastern Gray Squirrel (*Sciurus carolinensis*) share much of the same habitat throughout their range and depend on similar foods. This study examined the possibility of a relationship between Eastern Woodrat and Eastern Gray Squirrel abundance on two separate bottomland hardwood forest sites on the LSU AgCenter's Dean Lee Research Station, Rapides Parish, Louisiana. Woodrat abundance was estimated by nest counts and gray squirrel abundance was estimated via visual encounter surveys. Both woodrats and gray squirrels had greater abundance on one site, and the sites of greater abundance were opposite for the two species. However, attempts to use one species' abundance as a predictor of abundance of the other species produced unclear results.

Gaspard, C.M. and C.A. Corbat. LSU-A. **Relationship between Eastern Woodrat (*Neotoma floridana*) abundance and select habitat characteristics in a bottomland hardwood forest in Central Louisiana.—**This study explored potential relationships between Eastern Woodrat (*Neotoma floridana*) abundance and select habitat characteristics on two bottomland hardwood forest sites on the Dean Lee Agricultural Research Station in Rapides Parish, Louisiana. Eleven habitat variables were examined, but only percent inundation was related to woodrat abundance. Habitat characteristics suggested by other authors, such as density of palmettos (*Sabal minor*) and basal area of mast producing trees, were not correlated with woodrat abundance in our study.

Herron, M.H. and J. Bhattacharjee. ULM. **Testing the intermediate disturbance hypothesis through silvicultural forest gaps in bottomland oak plantation.—**In the last century, bottomland hardwood forests of the Lower Mississippi Alluvial Valley have undergone over 75% conversion to agricultural land. Efforts to reforest cropland have thus been a major priority for public and private conservation organizations. Early work involved planting a few select hard mast species, usually oaks, in relatively high densities. Thirty years later these stands remain homogenous in structure and composition and require manipulation to improve wildlife habitat. Much literature has focused on the effects of different silvicultural treatments on faunal taxa but few address impacts of such management practices on understory plant diversity. Our study measures the pre- and post-harvest vegetation response to three silvicultural treatments that emulate different intensities of natural disturbance. This "variable retention" method results in a wide variety of canopy gap sizes. We calculate openness of gaps using Digital Hemispherical Photographs that captures detailed images of forest canopy to determine whether intermediate canopy disturbances will provide maximum plant diversity.

Huner, J.V., M. Koniff, and R.R. Romaire, LSU-AC. **Developing a plant to manage Louisiana's wild-caught crawfish fisheries - politics versus biology.—**Louisiana boasts North America's largest freshwater crawfish fisheries. However, despite the fishery's immense social and economic importance, there is no management plan for it. At the request of the Louisiana Wild-Caught Crawfish Task Force, the Louisiana Crawfish Promotion and Research Board provided a modest grant to develop a draft management plan for review and transmission to the Louisiana Department of Wildlife and Fisheries (LDFW). The 2008 draft included several major

conclusions: more precise harvest data were needed; there was no justification for setting harvest seasons and trap mesh restrictions; and water flow during the winter-spring wet season needed to be enhanced in the Atchafalaya Basin, the principal fishery. No position was taken on the controversial trespass issue wherein land owners object to crawfishers accessing private lands during high water. Crawfishers objected to the plan because they felt it was intended to restrict access and concern over identification of purposely obscured prime fishing areas. To date, no action has been taken by LDWF on the plan. We discuss the politics of Louisiana's crawfish fisheries, the history and changes associated with the crawfish fisheries in the Atchafalaya Basin, and declines associated with transformation of the swamp ecosystem to a wet forest.

Division of Biological Sciences

Environmental Sciences Section

Naquin, A., J. Clement, M. Sauce, R. Grabert, and R. Boopathy. NiSU. **Presence of antibiotic resistant bacteria in raw and treated sewage in Thibodaux, Louisiana.—**Antibiotic resistance is becoming a very large problem throughout the world. After passing through the human or animal body, antibiotics enter into the sewage treatment plant, where water is processed and cleaned then returned into the environment. During the sewage treatment process, antibiotics come into contact with bacteria entering the treatment process, as well as bacteria used in the treatment process. The bacteria that are exposed to these antibiotics can become resistant during the treatment process and then expose the resistance genes to the environment upon release of treated water from the treatment plant. Because of the contact between bacteria and antibiotics during the process, sewage treatment plants are considered prime habitat to create antibiotic resistant bacteria. There are very limited studies on this subject from a small town sewage treatment plant. Therefore, this study was conducted using raw sewage as well as treated sewage from Thibodaux sewage treatment plant, which serves 15,000 people in rural southeast Louisiana. Samples were collected monthly from Thibodaux sewage treatment plant and antibiotic resistance was monitored using Kirby-Baur assay. Special attention was given to MERSA in raw and treated sewage samples for the nine months of the study period. Results showed the presence of MERSA consistently in both raw and treated sewage. The presence of mecA gene was confirmed in an isolate of pure culture of *Staphylococcus aureus* as well as in the sewage samples

Sauce, M., A. Naquin, R. Grabert, J. Clement, and R. Boopathy. NiSU. **Antibiotic resistance and tetracycline resistant *Enterococcus faecalis* in Thibodaux sewage treatment facility.—** Antibiotic resistance due to antibiotic resistant genes (ARGs) is one of the major public health problems that need urgent attention. ARGs have been reported in various environments such as river, groundwater, sediments, and influent and effluent of activated sludge of sewage treatment plants. ARGs are considered an emerging contaminant because of their widespread nature in various environments. It is important to address the critical problem of ARGs. The tetracycline class of antibiotics is one of the most commonly used therapeutics in human and veterinary medicine. Tetracycline resistant bacteria were reported from many environments. There are many tetracycline resistance genes reported in the literature. There are very few studies available on the prevalence of ARGs and antibiotic resistant enterobacteriaceae from sewage treatment plants serving a small town of 15,000 people. Therefore, this study was conducted to study the presence of tetracycline resistance genes and tetracycline resistant *Enterococcus faecalis* in Thibodaux sewage treatment plant in Thibodaux, Louisiana, which serves a population of 15,000 people. The results showed consistent presence of various tetracycline resistance genes including tet(A), tet(W), and tet(X) as well as tetracycline resistant *E. faecalis* in raw sewage as well as treated sewage in monthly samples.

Streeter, J.R., and J. Bhattacharjee. ULM. **Atmospheric carbon flux in a bottomland hardwood forest.—**As carbon continues to be a major driver of global climate change, it is critical to understand carbon flux. Detailed carbon budgets of terrestrial ecosystems are still poorly understood. Therefore, quantifying carbon flux of various ecosystems is needed to

understand global carbon budget. The lack of carbon budget data of bottomland hardwoods necessitates this research. Forested ecosystems are vital in regulating a majority of global carbon through photosynthesis and respiration. Carbon fixation during photosynthesis and emission during respiration comprises the primary constituents of carbon budgets. Net movement, or flux, of carbon determines if the system is a carbon source or sink. Carbon flux is measured using infrared gas analyzers that obtain high frequency data on carbon density over a forest canopy. The exact position of the sensors is dependent on canopy characteristics and area of interest. Preliminary data analyses suggest that bottomland hardwoods at Russell Sage WMA follow a seasonal pattern with sequestration during August-October and becoming a source from October-January. Diel patterns of carbon uptake also have been observed with carbon uptake strongest during early-mid day hours. Therefore, observed trends reveal consistent carbon balance patterns when compared to other forest types in North America.

Microbiology Section

Adedoja, A., K. Okoyeze, C.C. Creech, K.E. Jackson, and D.W. Jackson. ULM. **Assessing the microbial diversity of Bayou DeSiard through metagenomics.—**Bayou DeSiard is a heavily used waterway for recreational sports and fishing. The goal of this project is to increase our knowledge of the diversity of microbes in this aquatic environment. Knowledge of this relationship is necessary to anticipate responses that might alter the diversity and taxonomy. Samples are collected along Bayou DeSiard, at monthly intervals using dialysis tubing of 4 cm filled with filter sterilized bayou water, sealed, placed on a fishing hook in triplicate, and the line set out for 24 hours at a depth of 4 meters. Once removed, the dialysis tubing is rinsed and the DNA is extracted from the bacteria attached to the outer tubing, and sequenced using amplicon pyrosequencing. Data from the past seven months show phylogenetic diversity from the Bacteriodetes, Proteobacteria, Cyanobacteria, Deinococcus, Chlamydiae, Firmicutes, and Thermatogae. The data also show that the five most abundant genera of *Acinetobacter*, *Pseudomonas*, *Massilia*, *Novosphingobium*, and *Alkanindiges* are all soil/water microbes that can metabolize aromatic compounds. Once the one year study is complete, these data will be used to increase our knowledge of the diversity of microbes in this environment, and to predict any environmental changes. Supported by PFund 2013.

Alonzo, F.L., C.C. Creech, D.L. Graham, E.L. Hufford, J.D. Jones, B.L. McGregor, A.D. Meyer, O.J. Mardedor, L.A. Mohamed, O.J. Rivera, C.M. Simmons, A.M. Turner, and R.L. Minton. ULM. **Diversity of soil bacteria from a managed wildlife refuge in northeastern Louisiana, USA.—**Metagenomics is a relatively new field of research in which scientists analyze the genomes of organisms recovered directly from the environment. Most naturally occurring bacteria cannot be cultured and therefore cannot be analyzed by traditional means. Metagenomic studies provide us with a mechanism for analyzing previously metagenomic methods. Soil samples were collected from 30 sites in three habitats and DNA extracted from each was sent away for analysis. We report on family and phylum level analyses of diversity at each site and habitat. We identified 45 phyla and 290 families in nearly two million reads across all sites, with an average of 32 phyla and 201 families per site. Proteobacteria was the most abundant group in all habitat types. Bacterial diversity differed between upland forest and lowland hardwood sites

consistently; grassland sites tended to be more similar to lowland sites. We discuss causes for these relationships and their impact on conservation and management.

Collins, J.H., E. Pierce, and P.L. Hindmarsh. LTU. **Effects of combinatorial antifungal drugs on *Candida albicans*.—***Candida albicans* is the major fungal pathogen of humans. Due to the increasing incidence of drug-resistant *C. albicans* strains and the toxicity of current antifungal treatments, finding new and alternative methods of treating *C. albicans* infections has become a health care priority. The use of sub-inhibitory concentrations of antifungals in combination offers a possible strategy to address concerns about both drug-resistance and the toxicity of existing treatments. Our group has developed a novel assay to test the effects of antifungals used in combination on *C. albicans* growth. We administered sub-inhibitory concentrations of antifungals in combination sequentially with one and two hours separating the administration of the first and second antifungal. Preliminary results showed synergistic activity when 1 hour separated the administration of the first and second antifungals. Only a slightly additive effect was observed when 2 hours separated antifungal treatments. These results suggest a time-sensitive window of opportunity during which a combination of antifungals is most effective. We also observed hyphal switching in response to combinatorial antifungals when 2 hours separated the administration of the first and second antifungals. This result is interesting given that these antifungals normally inhibit hyphal growth and such a response has not been previously reported.

Grabert, R., M. Sauce, A. Naquin, J. Clement, and R. Boopathy. NiSU. **Presence of tetracycline resistant genes and tetracycline resistant *Enterococcus faecalis* in sewage treatment plant.—**Antibiotic resistance due to antibiotic resistant genes (ARGs) is one of the major public health problems that need urgent attention. ARGs have been reported in various environments such as river, groundwater, sediments, and influent and effluent of activated sludge of sewage treatment plants. ARGs are considered an emerging contaminant because of their widespread nature in various environments. It is important to address the critical problem of ARGs. The tetracycline class of antibiotics is one of the most commonly used therapeutics in human and veterinary medicine. Tetracycline resistant bacteria were reported from many environments. There are many tetracycline resistance genes reported in the literature. There are very few studies available on the prevalence of ARGs and antibiotic resistant enterobacteriaceae from sewage treatment plants serving a small town of 10,000 to 20,000 people. Therefore, this study was conducted to study the presence of tetracycline resistance genes and tetracycline resistant *E. faecalis* in Thibodaux sewage treatment plant in Thibodaux, Louisiana, which serves a population of 15,000 people. The results showed consistent presence of various tetracycline resistance genes including tet(A), tet(W), and tet(X) as well as tetracycline resistant *E. faecalis* in raw sewage as well as treated sewage in every monthly samples analyzed for nine months of the study.

Leonards, K., W. Dees. McSU. M. Pilligua-Lucas, O. Jones-Nelson, L. Garvin, and A. Jerse. USUHS. **Use of human transferrin to improve a female mouse model of *Neisseria gonorrhoeae* infection.—**The use of human transferrin (hTf) to improve a female mouse model of *Neisseria gonorrhoeae* infection was investigated. We first conducted in vitro assays with a wild type strain of *N. gonorrhoeae*, an hTf receptor mutant and a hemoglobin receptor mutant to demonstrate that *N. gonorrhoeae* can obtain iron, an essential nutrient, from human iron-binding glycoproteins through the expression of specific receptors. We then tested whether exogenously

delivered hTf would enhance experimental infection of Balb/c mice by wild-type *N. gonorrhoeae* by increasing the amount of available iron. Mice were infected with *N. gonorrhoeae* and given hTf intraperitoneally daily for ten days or left untreated. More *N. gonorrhoeae* were recovered from hTf-treated mice versus untreated mice on days +4 through +12 of infection, although the difference was not statistically significant (p=0.2523). However, the percentage of vaginal polymorphonuclear leukocytes (PMNs) also was greater in hTf-treated mice beginning on day +4, which is indicative of a difference in colonization load. The differences in colonization load and PMN response between treated versus untreated mice justify continued testing of the use of hTf to improve the female mouse model in future experiments.

Naquin, A., J. Clement, M. Sauce, R. Grabert, M. Sherpa, and R. Boopathy. NiSU. **Presence of antibiotic-resistant genes and methicillin-resistant *Staphylococcus aureus* (MRSA) in Thibodaux sewage treatment plant.—**Antibiotic resistance is becoming a very large problem throughout the world. After passing through the human or animal body, the antibiotics are entered into the sewage treatment plant, where water is processed and cleaned then returned into the environment. During the sewage treatment process, antibiotics come into contact with bacteria entering the treatment process as well as bacteria used in the treatment process. The bacteria that are exposed to these antibiotics can become resistant during the treatment process and then expose the resistance genes to the environment upon release of treated water from the treatment plant. Because of the contact between bacteria and antibiotics during the process, sewage treatment plants are considered prime habitat to create antibiotic resistant bacteria. There are very limited studies on this subject from a small town sewage treatment plant. Therefore, this study was conducted using raw sewage as well as treated sewage from Thibodaux sewage treatment plant, which serves 15,000 people in rural southeast Louisiana. Samples were collected monthly from Thibodaux sewage treatment plant and antibiotic resistance was monitored using Kirby-Bauer assay. Special attention was given to MRSA in raw and treated sewage samples for the nine months of the study period. Results showed the presence of MRSA consistently in both raw and treated sewage. The presence of mecA gene was confirmed in isolate of pure culture of *Staphylococcus aureus* as well as in the sewage samples.

Pierce, E., J.H. Collins, and P.L. Hindmarsh. LTU. **Effects of combinational antifungal drug treatment on drug resistant *Candida albicans.—Candida albicans*** is a ubiquitous commensal species of opportunistic pathogenic yeast that causes acute mucosal infections and, in immunocompromised patients, chronic invasive bloodstream infections. There are two categories of antifungal agents typically used to treat *C. albicans* infections: azoles and polyenes. Treating chronic *C. albicans* infections in immunocompromised patients with azole drugs has resulted in a significant increase in clinically isolated multi-drug resistant strains of *C. albicans*. One of the goals of our study is to determine the effectiveness of sub-clinical concentrations of drug combinations at overcoming drug resistance in *C. albicans*. We have already shown that antifungal drug combinations administered at different time intervals are more effective at slowing *C. albicans* growth than single drugs or drug combinations administered simultaneously. We now want to determine the growth limiting effects of antifungal drug combinations on drug resistant strains of *C. albicans*. Another goal of our study is to investigate changes in drug resistant *C. albicans* gene expression caused by treatment with drug combinations. Investigating the effects of antifungal drug combinations on drug resistant *C. albicans* will allow for more

effective treatment of chronic *C. albicans* infections by reducing both host toxicity and the potential for multi-drug resistance.

Scur, M. and P.L. Hindmarsh. LTU. **Searching For an optimal autonomously replicating sequence (ARS) in *Candida albicans*.—***Candida albicans* is a commensal yeast that exists in the human gastrointestinal tract which does not routinely cause any infections unless the patient's immune system is compromised. In recent years, the instances of systemic and localized *Candida* infections in cancer and HIV patients have increased significantly, prompting interest in this particular organism's route of infection and the methods that we can use to control its spread in high risk patient populations. Our laboratory has already created an autonomous replicating plasmid system in *C. albicans* using two elements from the Epstein-Barr Virus, a trans element, EBNA1 and a plasmid that contains a cis element, Family of Repeat sequence (pJK850-FR). This system ensures that plasmids will segregate into daughter cells during subsequent cycles of cell division. Since *C. albicans* is notorious for having a very plastic genome this system avoids the issue of plasmid loss and random homologous recombination into the *C. albicans*' genome. To achieve the goal of finding an optimum ARS isolation of a variety of sequences is necessary. These isolates would then be spliced into our custom engineered pJK850-FR plasmid and used to transform *C. albicans* cells.

Sills, C. and P.L. Hindmarsh. LTU. **Using green fluorescent protein as a biosensor to investigate redox activity in *Candida albicans*.—***Candida albicans* is a common opportunistic pathogen present in the natural flora of humans. When the immune system is suppressed, this yeast can form a serious infection commonly called Candidiasis. As a human pathogen, *C. albicans* has been treated successfully with different antifungals. Over time, certain strains of the yeast have become resistant to treatment. Therefore, it is imperative researchers learn more about this resistance so that new techniques to combat the pathogen can be discovered. It has been suggested that some antifungal drugs alter the redox status of *C. albicans*, which can cause changes in enzyme activity, oxidative defense mechanisms, and apoptosis. To determine whether antifungals alter the redox status in *C. albicans*, a redox sensitive version of yeast enhanced green fluorescent protein (yeGFP) will be produced. We will use site directed mutagenesis of yeGFP to make the yeGFP plasmid redox sensitive. The asparagine at amino acid position 149 and the serine at position 204 will both be replaced with cystines. These sites were chosen because they are ideal for disulfide bridge formation and when oxidized will cause a decrease in fluorescence.

Vining, J., A. Corbin, and R. Nathaniel. NiSU. **Isolating *Staphylococcus aureus* bacteriophage from nasal samples.—***Staphylococcus aureus* can colonize humans on their skin and is a transient organism in the external nares. Since *S. aureus* colonizes the nares, bacteriophages might be present in the nares as well. Nasal swabs from volunteers were tested for *S. aureus* by growth on mannitol salt agar and then placed in phosphate buffered saline (PBS) for future bacteriophage amplification. Colonies from MSA demonstrating morphological characteristics of *S. aureus* were tested for coagulase production. Five out of the 27 samples tested positive for *S. aureus*. Confirmed *S. aureus* isolates were used to amplify any species-specific bacteriophage in the inoculated PBS. Amplified samples were then filtered and tested for plaques on the cultures grown with an ATCC isolate of *S. aureus*. Those samples without recovery of *S. aureus* were mixed together, amplified, filtered, and tested for plaques. All the nasal swabs that tested positive

for *S. aureus* also tested positive for plaques on at least some plates. This confirmed that bacteriophages for *S. aureus* were present in the external nares. Bacteriophages also were recovered from specimens that tested negative for *S. aureus* colonization. Cross reactivity was identified between several of the nares isolates with recovered bacteriophage.

Molecular and Biomedical Biology Section

Fusilier, A. and K.A. Jackson. McSU. **Identification of *Klebsiella oxytoca* in Green Anoles of southwest Louisiana.—***Klebsiella oxytoca* is a gram-negative bacterium in the family Enterobacteriaceae. In humans, this bacterium can be found in mucosal membranes of the colon, nasopharynx and skin. *Klebsiella oxytoca* infections are often nosocomial, with the most common infections being urinary tract infections, pneumonia, wound infections and septicemia. The overall goal of this research project was to determine the rate of *Klebsiella oxytoca* colonization in Green Anoles of Southwest Louisiana. Fecal samples were obtained from *Anolis carolinensis* captured in Calcasieu Parish and tested for the presence of *Klebsiella oxytoca* by PCR. Seven out of 42 (17%) green anoles tested positive.

Prathipati, P., W. Alanazi, S. Fakhruddin, D.W. Jackson, and K.E. Jackson. ULM. **Evaluating the role of interstitial ATP and angiotensin II in accelerating nephropathy and oxidative stress during insulin induced hypertension.—**The crucial role of ATP in maintaining tubuloglomerular feedback (TGF) and renal vascular resistance along with regulating hemodynamic functions was previously reported. We thus hypothesize that insulin induced hypoglycemia augments interstitial ATP levels which in turn increases angiotensin II. Furthermore, increased angiotensin II interrupts normal TGF mechanism resulting in hypertension and ultimately renal damage along with oxidative stress. Male Sprague Dawley rats (200-225g) were anesthetized and microdialysis probes were inserted into their renal cortex. Post-surgery rats were treated with insulin (7U/kg body weight) or vehicle for 2 weeks. Dialysate was collected daily after insulin dosing for 2 weeks and analyzed for ATP by luciferin-luciferase assay and Ang II by ELISA. ATP and Ang II levels were elevated from 21.48 ng (day 0) to 75.52 ng (day 14) and 0.11 ng (day 0) to 0.17 ng (day 14), respectively. Heart and kidneys were collected at the end and analyzed for oxidative stress using EPR (Electron Paramagnetic Resonance). Oxidative stress was observed from the spectra obtained by using spin probes CMH and CPH. Thus the present study demonstrates the ability of hypoglycemia to promote the development of hypertension, which promotes an enhancement in oxidative stress. Supported by: Board of Regents, Research Competitiveness 2010.

Rizzo, E., S. Jackson, J. Arceneaux, R. Baudin, R. Beutner, M.B. Borque, L. Crawford, A. Fontenot, B. Gillikin, M. Hayes, R. Johnston, M. Kurz, M. Mouawad, A. Reed, C. Schilling, Z. Streeter, J. Vu, T. Wilson, A. Scott, M. Richters, D. Lovas, G. Jernigen, T. Nguyen, S. Bhuiyan, J. D. Jones, B. Miller, J. Harmson, C.R. Gissendanner, A.M.D. Wiedemeier, and A.M. Findley. ULM. **Comparative analysis of A3, A4, and A10 Mycobacteriophages: Sequence homology at the repressor binding site results in homoimmunity of related mycobacteriophages.—** Restriction digestion analyses for preliminary cluster assignment were conducted with the BamHI, ClaI, EcoRI, HaeIII, and HindIII enzyme panel. Many isolates cut only with HaeIII, which indicates that they are likely members of the ‘A miscellaneous’ group of

Mycobacteriophages. To gain further insight into their assignment, the NEB Cutter 2.0 virtual restriction digestion utility was used to identify additional enzymes whose restriction patterns could distinguish between members of subclusters A2-A10. NaeI, PflFI, PpuMI, SacI, SacII, SbfI, ScaI, and StuI were chosen for the subsequent digestion of targeted isolates. Additionally, we developed (and confirmed by PCR) a lysogen culture of *Mycobacterium smegmatis* containing the prophage Peaches (A4). This culture was utilized to screen novel phage isolates to determine their homo/heteroimmunity with Mycobacteriophage Peaches. Two isolates, Rockstar and Trike, were unable to infect the Peaches lysogen culture, and therefore, were initially assumed to be probable members of the A4 cluster of Mycobacteriophages. However, data from the additional restriction enzyme digestion panel screen and subsequent full genome sequencing of Rockstar and Trike indicated that they were members of the A3 and A10 clusters, respectively. A functional annotation of Trike and its comparison to other A10 and related A3 and A4 cluster members is presented. We provide a comparative analysis of repressor binding site sequence homology for selected A3, and all known A4 and A10 Mycobacteriophages which furnishes additional evidence for the observed homoimmunity between members of these related, but not identical, cluster representatives.

Zoology Section

Arabie, L., and J.D. Hoffman. McSU. **Influence of forest edge on the occurrence and abundance of small mammals.—**Two anthropogenic disturbances that are commonly found in Louisiana forests include overhead power lines and underground pipelines. The areas that are cleared for these structures result in different edge habitat with the adjacent forest. Areas cleared for pipelines are regularly mowed and kept free of tall grass and brush, thus creating a defined forest edge. Overhead power lines are not maintained as often which allows grasses and shrubs to exist. This creates a gradual transition from grass to woody vegetation along the forest edge. Our objectives were to measure small mammal abundance and occurrence in relation to the forest edge for areas containing an underground pipeline and overhead power line. We set up grids of 70 Sherman live traps in each area. We checked traps for five consecutive days and marked each individual with a Montel ear tag. Abundances were higher for all species (*Neotoma floridana*, *Peromyscus gossypinus*, *Reithrodontomys fulvescens*, *Sigmodon hispidus*), at the overhead power line habitat compared to the pipeline. Individuals captured at the pipeline occurred further away from the forest edge than individuals captured at the power line.

Ardizzone, C.M., T.P. Wood, A.M.J. Shudes, T.L. Sylvester, and W.H. Dees. McSU. J. Hightower. CPMC. **Longitudinal studies of adult mosquitoes in a city park.—**A seasonal longitudinal survey of adult mosquitoes is underway at a newly renovated, residential 24 acre woodland park. The park is separated into two distinct areas: one is an open area with playground equipment, picnic tables, open shelters, a small conference center, exhibits, wetland ponds, and concrete walking paths with benches; the other is a preserved forest with nature trails. The mosquito survey was initiated in summer 2011. We use Centers for Disease Control and Prevention (CDC) light traps baited with CO_2 to collect mosquitoes. Mosquitoes are collected in the open area near the preserved forest in each of the four seasons: spring, summer, fall and winter. Meteorological data are recorded during each trap night. To date, the predominant species collected (i.e. >50 in one trap night) were *Aedes taeniorhynchus*, *Ae. vexans*,

Coquillettidia perturbans, *Culex nigripalpus*, *Cx. salinarius*, and *Psorophora columbiae*. *Mansonia titillans* and *Uranotaenia* spp. were collected only in the fall. Information obtained in this study can be used to determine potential health risks associated with nuisance and disease vector mosquito species.

Beachy, C. SU. **The influences of growth and temperature on metamorphosis in the plethodontid salamander, *Eurycea wilderae*.—**Most species of animal have a complex life cycle, i.e., one that includes a metamorphosis. When larvae of the same species grow at different rates in the same environment, the result is variation in metamorphic timing. However, in all species of plethodontid salamanders that have been the subject of experimental manipulations of larval growth, variation in growth has failed to elicit variation in larval period. These manipulations have only been conducted on members of two of the three larval lineages (i.e., Desmognathus and Hemidactylium). I conducted a growth experiment on *Eurycea wilderae*, a member of the third lineage that includes biphasic species. I collected 64 larval *E. wilderae* from a headwater stream in Jackson County, North Carolina, and then grew larvae at two food levels and two temperatures. I analyzed metamorphic timing and size in a 2 X 2 design. As expected, larvae with lots of food grew more. At low temperature, larvae grew slower. Larvae at low temperature metamorphosed later. However, variation in growth that was induced by food level did not result in variation in metamorphic timing. This result confirms that this pattern is likely general in all plethodontid larvae. Plethodontid salamanders are unique among all animals in that variation in growth rate fails to affect metamorphic timing. I suggest that this unique life history feature in part accounts for the extensive life history variation in the family and that this is the result of ancient selection for canalization of maturation timing in stream-dwelling species.

Dees, W., J. Theriot, K. Leonards, J. Byrne, C. Ardizzone, A. Richard, J. Dupre, T. Estrada, O. Christian, C. Richmond, and J. Woolman. McSU. J. Hightower. MCCPPJ. A. Daugereaux and S. Mopper. ULL. **Using our natural resources to prevent and control mosquitoes.—**The Medical Entomology Research Laboratory at McNeese State University is investigating if components of plants native to Louisiana alter the behavior and development of medically important arthropods. Information obtained from these investigations may lead to innovative pest management methodologies as well as novel personal protective measures against biting arthropods. Current studies focus on the effects of botanical components on mosquito mortality. We evaluated the effects of freshly-cut plant parts from eight plant families on female *Aedes aegypti* mosquitoes. Plant families included: Apiaceae, Apocynaceae, Asteraceae, Euphorbiaceae, Lamiaceae, Lythraceae, Malvaceae, and Verbenaceae. Standard plastic Petri dishes were used to hold mosquitoes and cut parts from 17 plant species. We recorded percent mortality at 24 and 48 h. Mosquitoes exposed to fresh-cut flowers/petals, buds, leaves, stems, and seeds from Apiaceae, Asteraceae and Lamiaceae exhibited over 50% mortality when compared with controls. Genera of interest include: *Chrysanthemum*, *Eryngium*, *Eupatorium*, *Rudbeckia*, *Monarda*, and *Pycnanthemum*. Mosquitoes exposed to different parts of a chrysanthemum plant (flowers, buds, leaves and stems) exhibited 100% mortality in 24 h. Mosquitoes exposed to cut buds of *P. muticum*, *P. tenuifolium*, and *M. fistulosa* exhibited 100% mortality in 24 h.

Eppling, K. and B.C. Moore. **Identification of mucin-rich, secretory sulcus epithelium in American alligator.—**The sulcus spermaticus on the alligator phallus transports sperm from the

ductus deferens to the female cloaca. Other than physical transport, little is understood about the function of this structure. Here we investigated the sulcus of adult, male alligator phalli using histochemical staining techniques to detect mucins. These glycoproteins may play many roles in facilitating reproduction including serving as a pathogenic barrier, lubricant, and sperm support longevity. We observed distinct epithelial staining patterns for both neutral and acidic mucins. Furthermore, these patterns differed in proximal to distal aspects of the sulcus, putatively showing regionality of distinct functions. Taken together, this study demonstrates that the phallic sulcus of the American alligator is a functionally complex, heterogeneous structure. Further work will focus on understanding the defining characteristic of sulcus mucins.

Fagan, N. and R. Minton. ULM. **Environmental factors affecting shell shape in the land snails *Haplotrema concavum* and *Mesomphix globosus*.—**North American land snails vary in their shell shapes from flat through globose. Shells can vary dramatically within a species based on environmental and genetic factors. How the environment specifically shapes phenotypic traits in land snails is poorly understood. We addressed this issue using geometric morphometrics to quantify differences in two unrelated land snail species, *Haplotrema concavum* (flattened) and *Mesomphix globosus* (more globose). Shape variables were correlated with a suite of environmental variables taken from GIS layers. We show the results of our analyses indicating which environmental variables contribute most to variations in shell shape. We also compare our findings to previous works using a third land snail species, *Mesodon thyroidus* (globose).

French, J.D., J.Y. Atwell, and B.C. Moore. LTU. M.M. Chumchal. TCU. **Metal bioaccumulation and melanomacrophage aggregates in Spotted Gar (*Lepisosteus oculatus*) liver.—**Toxic metal contamination of aquatic environments can pose serious health threats to fish, especially those in higher trophic levels due to biomagnification. Elevated mercury concentrations can jeopardize overall fish health in various ways including liver damage resulting in a robust immune response. Hepatic mercury accumulation has been demonstrated to increase the formation of melanomacrophages in Spotted Gar, as a consequence of mercury-mediated tissue damage. Additionally, melanomacrophage aggregates scavenge iron after tissue damage. We investigated the relationship between hepatic mercury and iron concentrations and the frequency of liver melanomacrophages in Spotted Gar from two southern Arkansas lakes with varying levels of mercury contamination. In liver tissues, we quantified the size and frequency of melanomacrophage aggregates and related these values to total mercury and iron concentrations. Lower liver mercury concentrations were found in the fish from Calion Lake, compared to those from the mercury-contaminated Felsenthal NWR. Though different in magnitude of response, fish from both sites exhibited increased hepatic melanomacrophage aggregates with increasing liver mercury concentrations. These associations, along with variations in hepatic iron concentrations, will be discussed in light of possible impacts on Spotted Gar health and other fish in similar ecosystems.

Ke, Y., and J. D. Hoffman. McSU. **Geographic variation and subspecific status of the swamp rabbit (*Sylvilagus aquaticus*).—**There has been much debate in the scientific literature on whether or not two subspecies of the swamp rabbit, *Sylvilagus aquaticus aquaticus* and *S. a. littoralis*, exist. The latter subspecies is believed to be restricted to habitats along the coast line of Texas, Louisiana, Mississippi, and Alabama. The objectives of this research are to record a standard set of cranial measurements from voucher specimens of the swamp rabbit that are

housed in natural history collections and use multivariate statistics to assess the degree of geographic variation among populations throughout Louisiana. Morphological variation was assessed by taking 26 cranial measurements with a digital caliper and rounded to the nearest 0.01 mm. We performed analysis of variance (ANOVA) to determine the extent of secondary sexual variation and a multivariate analysis of variance (MANOVA) to detect differences in morphological variation among sampling units. Our results indicated no significant secondary sexual variation between male and female rabbit. Also, no significant difference was detected between sampling units. Based on these results we suggest that *S. a. littoralis* is not a valid subspecies.

Merchant, M. McSU. M. White. SELU. C. Moran. US-A. **Crocodilian nuclear factor Kappa B1: Functional domain analysis and homology with other vertebrates.—**We have deduced the amino acid sequence of the Nuclear Factor KappaB1 (NF-kappaB1) protein from genomic data for the American alligator (*Alligator mississippiensis*), the estuarine crocodile (*Crocodylus porosus),* and the Indian gharial (*Gavialis gangeticus*). A 105 kDa protein, NF-kappaB1 exhibits complex post-translational processing multiple mechanisms of activation, and acts as precursor for a p50, a Rel homology transcription factor, which influences the transcription of key genes for developmental processes, apoptosis, and immune function. The amino acid sequences of the crocodilian proteins share very high sequence identity with each other (97.2 ± 0.7%), birds (81.0 ± 1.1, n=6), mammals (75.3 ± 1.6, n=4), reptiles (80.3 ± 5.1, n=2), and less identity with fish (55.5 ± 5.5, n=4) and one amphibian (66.1 ± 0.8). The crocodilian protein has a well-conserved Rel homology domain, nuclear localization signal, and a glycine-rich region which facilitates proteasome-mediated generation of p50. The Rel homology domain facilitates dimerization, DNA-binding, and nuclear translocation activities. In addition, seven ankyrin repeats were located on the C-terminal half of the protein, which putatively allow for inhibition of transcriptional regulation by mediating interaction with Inhibitor Kappa B.

Meyer, A. and R. Minton. ULM. **Patterns of shell plasticity in two species of land snail, *Anguispira alternata* and *Euglandina rosea*.—**Numerous organisms exhibit various forms of phenotypic plasticity in response to their environments. In this study, we explore morphological diversity in the shells of two land snails, *Anguispira alternata* and *Euglandina rosea*, and correlate it with abiotic measures to determine how much shell shape plasticity exists in each species. These species are unrelated and have very different shell forms and life histories. *Anguispira alternata* possesses a flattened shell and is herbivorous/detritivorous, while *E. rosea* has an elongate shell and is a carnivore. Shells from both species were landmarked and analyzed using geometric morphometrics. Environmental data for each specimen were extracted from database layers using ArcGIS. We show the results of our analyses indicating which environmental variables contribute most to variations in shell shape, and compare our findings to previous work using a third land snail species, *Mesodon thyroidus*.

Meyer, H.A. McSU. **Redescription of the tardigrade species *Echiniscus cavagnaroi* from type material, with new records from Hawaii and Bermuda.—**The description of *Echiniscus cavagnaroi* Schuster & Grigarick, 1966, a species of water bear (tardigrade) is emended with new measurements of the holotype and eleven paratypes (all from the Galapagos Islands). The length of Cirrus A in the holotype was only half that reported in the original description. Moreover, the largest values for Cirrus A length and Cirrus A to body length ratio for any

specimen were also lower than in the original description. Variation in the presence or absence of spines was considerably greater than originally described. Spines C, Dd and E were not present on all specimens. The length of spines Dd and E, when present, varied greatly among specimens. The geographical range of *E. cavagnaroi* is expanded by new records from the Hawaiian Islands and Bermuda. The high variability in presence or absence and length of spines in *Echiniscus cavagnaroi* underscores the importance of assessing variability in these characteristics when identifying unknown specimens or describing new species in the genus. This requires using as many specimens as possible, and fully reporting variability.

Meyer, H.A. McSU. **The Gamecocks water bear: A new species of tardigrade from the campus of the University of South Carolina.—**Water bears (Phylum Tardigrada) are small relatives of arthropods commonly found in lichen, moss, leaf litter, soil, and freshwater. A new species of tardigrade is described from moss and lichen collected from trees on the campus of the University of South Carolina. The new species belongs to the *Echiniscus bigranulatus* group. It differs from all other species in the group in having no basal spurs on any of its claws and in the weak development of dentate collars on the fourth legs. The discovery of this new species extends the known range of the "bigranulatus" group, hitherto considered restricted to Central and South America, to the southeastern United States.

Sullivan, B.T., USDA Forest Service Southern Research Station, and A. Niño Domínguez, El Colegio de la Frontera Sur, Tapachula, Mexico. **The southern pine beetle has an (equally?) evil twin in southern Mexico and Central America.—**The southern pine beetle, *Dendroctonus frontalis*, is historically the most serious economic pest of pines in Louisiana and elsewhere in the Southeast. It ranges from New Jersey to Nicaragua and wherever it occurs periodically causes large-scale mortality of pines. It has recently been discovered that pine mortality associated with southern pine beetle in southern Mexico south to Nicaragua involves two sibling species—one of them new to science—which colonize the same trees simultaneously. These two species have evolved distinct characteristics which may enhance their mutual capacity to kill and reproduce in vigorous, well-defended hosts. We discuss how this ostensibly symbiotic relationship which affects southern pine beetle populations in southernmost portions of its range may or may not have any parallel in the southeastern United States.

Vaidya, T., A. Adams, G. LaFleur, and R. Nathaniel. NiSU. **A study of the efficiency of complement protein in Black Drum, *Pogonias cromis*.—**Complement is the major component of the innate immune system in which pathogens are lysed or undergo phagocytosis. Fish are free-living animals and rely on an efficient innate immune response to protect against a range of pathogens. Though complement system has been documented in many fish, to date no work has been done to detect complement protein in the Black Drum, *Pogonias cromis*. Antibacterial activity of Black Drum serum was tested by incubating fish serum with fixed concentration of bacterial inoculum (10E5 CFU/ml) at room temperature for two hours. Reaction mixtures were spread on Tryptic Soy Agar plates and incubated at 37˚C overnight. Efficiency of antimicrobial activity in serum was measured by enumerating colonies. Antibacterial activities of black drum serum against *Escherichia coli*, *Pseudomonas aeruginosa*, *Staphylococcus aureus*, *Bacillus subtilis* and *Edwardsiella tarda* were found to be 87%, 60.31% , 72.35%, 73.04% and 68.57%, respectively, compared to control. Complement inhibitors will be used in the future to determine whether bactericidal activity seen is due to complement protein. These results help in

understanding the immune responses of Black Drum as well as provide insight into the conserved nature of the complement system across various species.

Vidrine, M. F. LSU-E. **Unionicola: Mites of freshwater mollusks.—**In 1973, I published my first paper on Unionicola. In the 40 years since that publication, the number of described species has doubled to 251--a result of a worldwide search. As common parasites of freshwater mussels and snails (ca. 60% infection rates globally among suitable hosts), continued searching should yield another doubling in the number of species. Our new book (Edwards and Vidrine 2013) titled "Mites of Freshwater Mollusks" provided a review of the global status of the genus. We also reviewed the host records and the classification of the mites. A discussion of the overall contributions of the book is the focus of this presentation. Errors, corrections and updates also are presented.

White, K. and R.L. Minton. ULM. **Relationship between niche breadth and distribution of Polygyridae in the eastern United States.—**A multitude of factors can affect a species' distribution over its geographic range. Generally speaking, resource partitioning affects the rarity of an organism due to its adaptability and tolerances to environmental pressures. While several studies have indicated that common organisms occupy a variety of niches, and are thus considered generalists, others have found that some species are more specialized and competitive within widespread habitats. Because the relationship between niche breadth and geographic range is not exact, there needs to be further research as to which groups are generalists and which are specialists. We present data examining the correlation between niche breadth and species range in Polygyridae, a ubiquitous family of North American land snails, and discuss the ecological and evolutionary aspects of this relationship.

Xu, X., and J. D. Hoffman. McSU. **Predicted distributions of small terrestrial mammals in need of conservation in Louisiana.—**One of the challenges for conserving species with small population sizes is identifying areas of suitable habitat. Recent advances in predictive modeling have allowed researchers to use information on where a species occurs to predict other areas throughout the landscape that contain high quality habitat. The objective of this research is to predict the distributions of small terrestrial mammals in Louisiana that possess a state conservation of ranking of S1 or S2. We collected digitized environmental layers and locality information for *Chaetodipus hispidus*, *Sorex longirostris*, *Spilogale putorius*, and *Bassariscus astutus*. We used the model Maxent to predict the distributions of each species and to determine which environment variables were most important to predicting the distribution. For *C. hispidus*, most habitat quality was found in the west central portion of the state. Most suitable habitat for *Sorex longirostris* and *Spilogale putorius* were in the southeast part of the state. Finally, little suitable habitat was predicted for *B. astutus* in Louisiana.

Zou, E. and I. B. Denys. NiSU. **Activities of superoxide dismutase, ethoxyresorufin o-deethylase, and malondialdehyde in *Fundulus grandis* exposed to BP oil and Corexit 9500.—**The oil rig Deepwater Horizon exploded in the northern Gulf of Mexico (NGM) and released 4.9 million barrels of crude oil into the waters. Corexit 9500, a dispersant, was used extensively to combat the spill. The Gulf Killifish, *Fundulus grandis*, was exposed to the oil, dispersant, and combination of oil and dispersant in this experiment. Exposure did not produce a significant difference when assayed for malondialdehyde (MDA) concentration, superoxide dismutase

(SOD), and ethoxyresorufin O-deethylase (EROD) activities. These biomarkers were used to test for lipid peroxidation due to exposure.

Division of Physical Sciences

Chemistry Section

GC, R., P.P. Sanchetti, and U. Siriwardane. LTU. **Synthesis and characterization of CaO/ alumina, CaO/silica, and SO_{4-2}/TiO_2/silica supported catalysts for the conversion of soybean oil and methanol to biodiesel.—**With the impending shortage of traditional fossil-based petrol fuels, it is important that research continues in the search for sustainable alternatives. Biodiesel has shown promise that it can alleviate some of the reliance on gasoline and traditional diesel. We have prepared particles, containing nanoparticle metal oxides, CaO/alumina, CaO/silica in various metal w/w% ratios by sol-gel and impregnation methods. The catalysts were characterized by differential thermal analysis (DTA) and thermo-gravometric analysis (TGA), surface area analysis by BET method and phase identification by powder x-ray diffraction (XRD). All catalysts were calcined at 450°C and used in a gas glass reactor. The catalysts activity of soybean oil conversion mixed the various proportions of methanol to biodiesel was investigated using a glass reactor. In this poster, we will present the DTA, TGA, BET, XRD and catalytic data and compare the conversion efficiencies of the catalysts.

Bergeaux, T.J. and C.C. Huval. LSU-E. **Correlation of chemical structure, stability and boiling point of C_3-C_{10} isomeric alkanes, monoalkenes, and monoalcohols.—**The correlation of physical and chemical properties with structure is the essence of chemistry. For example, it is commonly taught in undergraduate organic chemistry courses that: (1) boiling points decrease with increased branching for isomeric alkanes, (2) the stability of isomeric alkanes increases with the amount of branching, and (3) the stability of isomeric alkenes increases with alkene substitution. In this study, some of these common, and some other, structural trends of C_3-C_{10} carbon, hydrogen, and oxygen containing organic molecules were examined using physical (boiling points and melting points, °C) and thermodynamic data (standard enthalpies of formation, kJ/mol) that are published in the CRC Handbook of Chemistry and Physics, 90th edition. The standard heat of combustion for these compounds was calculated from enthalpy of formation. As shown in the CRC Handbook of Chemistry and Physics, the standard heat of combustion for compounds containing only carbon, hydrogen, and oxygen ($C_aH_bO_c$) is given by the equation: standard heat of combustion = 393.51a + 142.915b + standard enthalpy of formation of $C_aH_bO_c$. Analyses of boiling points and stabilities with chemical structures for constitutionally isomeric C_3-C_{10} compounds, including alkanes, monoalkenes, and monoalcohols, will be presented.

Mobley, B.W. and J. Fotie. SLU. **Silver(I)-catalyzed intermolecular C-N bond formation through a C-H/N-H direct coupling of secondary amines.—**As part of a continued effort to develop new silver(I)-catalyzed coupling reactions, we recently discovered that silver(I) can catalyze an intermolecular C–N bond formation via a C–H/N–H direct coupling under mild conditions. This represents one of the rare instances where silver(I) is used as a catalyst in the creation of a new intermolecular C–N bond through a direct C–H functionalization. Throughout this presentation, we will discuss the optimization of the reaction conditions as well as a preliminary scope of this reaction.

El-Giar, A.E. LTU. A-M. Simon, S.M. Atwa, and E.M. El-Giar. ULM. **Electrochemical impedance spectroscopy properties of poly(oxyphenylene)-coated mild steel in NaCl aqueous solution.—**Steels are a large family of iron-based alloys that are widely used in engineered structures and components. Mild steels are extensively used in many applications due to their low cost and good mechanical properties (e.g., high strength and hardness, good formability). Accordingly, there is a great interest in studying the metallic corrosion of these alloys. This research seeks to minimize the corrosion of mild steels by electrochemically insulating the alloy with a micrometer-thin coating of poly(oxyphenylene). This film provides a tenacious, tough, and durable insulating layer with good adhesion to the steel surface. A micrometer range film thickness is sufficient to protect the alloy surface and thus satisfactorily slowing down the rate corrosion upon exposure to corrosive media. The performance of poly(oxyphenylene)-coated steel coupons was investigated in aqueous solution of 3.5 wt% NaCl using several electrochemical techniques, including open circuit potential, cyclic voltammetry, and electrochemical impedance spectroscopy (EIS). In addition, surface analysis techniques such as optical microscopy and scanning electron microscopy (SEM)were used to characterize the coatings. Optimum coating conditions (e.g., polymerization potential, film thickness, and polymerization time) were determined to provide the most stable and durable film leading to maximum corrosion protection for the steel alloy.

Esumike, S. and V.N. Seetala. GSU. U. Siriwardane. LTU. **Synthesis and characterization of Ni, Co. Fe, Fe/Co, Ni/Fe and the study of promoter effect of Ru on alumina supported catalysts for the conversion of syngas and hydrocarbons: FT process.—**With the impending shortage of traditional fossil-based petrol fuels, it is important that research continues in the search for efficient catalysts. The FT (Fischer–Tropsch) process is a collection of chemical reactions that converts a mixture of carbon monoxide and hydrogen into liquid hydrocarbons. We have prepared particles, containing nano-particle metal oxides, NiO, CoO, FeO, FeO/CoO, and NiO/FeO in various metal w/w% ratios by sol-gel oil drop methods as FT catalysts. Same catalysts compositions with various RuO w/w% also were prepared. The catalysts were characterized by differential thermal analysis (DTA) and thermo-gravometric analysis (TGA), surface area analysis by BET method and phase identification by powder x-ray diffraction (XRD). All catalysts were calcined at 450°C and later activated by passing H_2 at the same temperature. The catalysts activity of synthesis gas conversion to hydrocarbons was investigated using a gas phase reactor using mixtures of CO and H_2. In this poster, we will present the DTA, TGA, BET, XRD and catalytic data and compare the conversion efficiencies of the catalysts and the promoter effect of the Ru.

Hebert, A., C. Bazar, T. Bergeaux, S. Breaux, H. Deshotel, S. Doucet, L. Frederick, H. Luke, C. Quebedeaux, M. Richard, J. Tucker, and C.C. Huval. LSU-E. **Treasure from a trash tree: Biofuel from the common chicken tree.—**The chicken tree, *Triadica sebifera* aka *Sapium sebiferum* aka *Stillingia sebiferum* is a common tree in Louisiana and throughout the southeastern United States. Chicken trees were first introduced in the U.S. by Benjamin Franklin in the 1770's. Having been planted in the U.S. mainly for ornamentation, today chicken trees are considered an invasive nuisance. Because of their surplus, and potential ease of cultivation, we are investigating practical applications of the chicken tree. In particular, seeds of chicken trees are composed of a waxy tallow coating that has the potential as a biofuel source. In this study, the extraction of the vegetable tallow of chicken tree seeds was investigated. Seeds were

harvested from chicken trees in St. Landry Parish in August 2013. The tallow was extracted from the seed using various solvents (reflux). The following yields (g tallow/g solvent) were obtained: toluene, 0.22; methylene chloride, 0.14; hexane, 0.16; ethyl acetate, 0.15; ethanol, 0.053; isopropanol, 0.13. The tallow is a white, opaque, low melting solid. A simple chicken tree tallow candle was then made. These chicken tree tallow candles burned a yellow flame with neither smell nor smoke.

Wilson, J.R., D.H. Bard, and J. Fotie. SLU. **Silver(I)-catalyzed homo-coupling of aliphatic cyclic and acyclic amines resulting in a direct formation of an N-N bond.—**Through this presentation we will be discussing the optimization of the reaction conditions for silver(I)-catalyzed homo-coupling of aliphatic cyclic and acyclic amines resulting in the preparation of substituted hydrazine derivatives as well as a preliminary scope for this reaction.

Kimball, E.A., A. Pandey and D.D. Dolliver. SLU. K.H. Shaughnessy. UA. F.R. Fronczek. LSU. **Ortho-alkoxylation of diaryl ketoxime ethers.—**This project describes the optimization of conditions for the palladium-catalyzed ortho-methoxylation reaction of diaryl ketoxime ethers. Reactions have been run under different conditions (temperature, concentration, time, type of oxidant, amount of oxidant, amount of catalyst, and solvent) to optimize yield(s). The reaction gives the (Z)-mono-, (E)-mono-, and di-methoxylated products, and the amounts of these products can be modified depending on conditions. A palladacycle of the oxime ether of benzophenone has been synthesized to help investigate the reaction mechanism. Yields with different substituents on the ring and with different alcohols will be discussed.

Lu, Y. LC. **Electron transfer in the molecular quantum-dot cellular automata: The competition between Coulomb effect and nuclear relaxation.—**Mixed-valence compounds are potential candidates for promising molecular quantum-dot cellular automata. Understanding charge distribution and controlling charge transfer of mixed-valence compounds are important for binary information coding and processing. According to the Robin-Day classification of mixed-valence complexes, charge localization/delocalization is determined by the ratio between the nuclear reorganization energy and the electron transfer (ET) matrix element. Common wisdom suggests that type III mixed-valence compounds are unsuitable for molecular QCA due to charge delocalization. Yet the driving force of charge localization in the molecular QCA is the Coulomb interaction between neighboring molecules rather than the nuclear reorganization energy. Here, we present a case that type III mixed-valence compounds can be localized by a neighboring molecule, thus are suitable to be molecular QCA. Our conclusion is based on computational studies using CASSCF methods on model molecules containing biphenalenyl radical cations.

Minor, C.K. and U. Siriwardane. LTU. **Synthesis and characterization of CuO/ZnO and Cr_2O_3/ZnO alumina supported catalysts for the conversion of syngas to methanol: Biomass to methanol.—**Methanol is an alternative fuel for internal combustion and other engines, either in combination with gasoline or directly. Syngas-methanol catalysts allow the efficient C-recycling and reduce the CO_2 emissions compared to direct biomass combustion. We have prepared alumina particles, containing nano-particle metal oxides, CuO/ZnO, Cr_2O_3/ZnO in various w/w ratios (3:3, 2:4 and 4:2) by sol-gel method for the syngas-methanol conversion. The catalysts were characterized by differential thermal analysis (DTA) and thermo-gravometric

analysis (TGA), surface area analysis by BET method and phase identification by powder x-ray diffraction (XRD). All catalysts were calcined at 450°C and used in a gas phase reactor. The catalysts activity of synthesis gas conversion to methanol was investigated using a gas phase reactor using mixtures of CO and H_2. In this poster we will present the DTA, TGA, BET, XRD and catalytic data and compare the conversion efficiencies of the catalysts.

Pallerla, S., R. Sable, and S.S. Jois. ULM. D. Bhupathiraju and G.M. Vicente. LSU-BR. **Targeted delivery of doxorubicin through conjugation with peptidomimetic that binds to extracellular domain of HER2 receptor.—**Doxorubicin (DOX) is the cornerstone in the therapy of many carcinoma types. Unfortunately, the cytostatic effect of DOX in therapeutic doses is frequently insufficient; however, the use of higher DOX doses is limited by the development of systemic toxicity, especially cardiotoxicity. Many approaches have been used to deliver doxorubicin to the active site by conjugating the drug with peptides, antibodies, hormones, etc. In the current approach, we have attempted to conjugate doxorubicin to a peptidomimetic that is highly specific for HER2 positive cancer cells. The peptidomimetic we have designed (compound 5) is known to bind to extracellular domain of HER2 and inhibit protein-protein interaction of human epidermal growth factor receptors. Different strategies were used to synthesize the conjugate of compound 5 with doxorubicin. Compound 5 was synthesized by manual solid-phase peptide synthesis and the N-terminal was left with F-moc protection. Doxorubicin was conjugated to the C-terminal part of compound 5. The synthesized compound was purified by HPLC and analyzed by mass spectrometry. This project is supported by the NIH through the NIGMS grant 8P20GM103424.

Richard, M. and C.C. Huval. LSU-E. **Preparation and evaluation of modified iron for improved contaminant remediation.—**Iron is used in situ at chemical spill sites for the remediation of non-aqueous phase liquid (NAPL) contaminants. In this study, iron particles were modified towards improving their remediation properties. Iron powder was modified with natural hydrophilic polymers (gelatin and psyllium) to make its surface more hydrophilic and better able to distribute in aqueous environments, as measured with settlement rates. Materials with slower settlement rates are expected to disperse better in aqueous phases and are less likely to bind to soil. The settlement rates were obtained by inverting a sealed test tube that contained 20 mL of water and 100 mg iron material, 10 times. The settlement rate, defined as the time it took for all visible particles to settle, was recorded. This was repeated three times and averaged. While the settlement rate (420 s) of gelatin modified iron powder did not change, iron powder modified with psyllium fiber at 180 °C had a slower settlement rate (590 s) in water than unmodified iron powder. Supported by LSU-E Foundation URSI 2013 and LSU Eunice 2012-2013 Train Derailment Endowed Professorship.

Simon, A-M. ULM. A.E. El-Giar. LTU. S.M. Atwa and E.M. El-Giar. ULM. **A simple cyclic voltammetry experiment for the determination of the active ingredient in children's Tylenol® elixir.—**Cyclic voltammetry (CV) is one of the most versatile electrochemical techniques used for acquiring qualitative and quantitative information about electrochemical reactions. One of the very common uses of CV is to determine the concentration of electroactive (redox) species. Acetaminophen (4-acetamidophenol) is the active ingredient in several over-the-counter pain relief medications including Tylenol®. Although it is currently the medication of choice as a pain relief, especially for infants and children, higher doses of acetaminophen are

proven to cause kidney and liver damage in humans. Acetaminophen is an electroactive compound that can be electrochemically oxidized to N-acetyl-p-quinoneimine in an irreversible 2-electron, 2-proton (H^+) loss step. The oxidation step is observed as anodic (oxidation) current when the potential of a working electrode is swept in the positive direction. The anodic peak current (ipa) is proportional to the concentration of the acetaminophen in the elixir. In this work, CV is used to verify the concentration of acetaminophen indicated on the label for Tylenol® elixir using disposable screen-printed carbon electrodes and a commercial contact saline buffer as the supporting electrolyte. The study will also include the effect of the scan rate, pH, and temperature on the activity of acetaminophen.

Spiller, P., T. Junk, and A.A. Gallo. ULL. **Studies of supercritical solvent use for the formation of biodiesel from alligator fat.—**Previous research in our lab has shown that alligator fat can be converted to biodiesel using standard transesterification reaction conditions with methanol. We recently developed an alternative procedure, using a batch process, with supercritical methanol, for the formation of biodiesel from alligator waste. Our new process was developed in order to eliminate the use of a catalyst, reduce solid waste products present in the standard method and to simplify the workup. A description of the equipment and reaction conditions will be discussed. The percentage of methyl esters (biodiesel) using our supercritical method ranges from 65-94% depending on the physical state of the waste (oil, fat, or residue) and the reaction time and temperature. These results are equal to or better than those forming biodiesel by the standard transesterification method. Our optimized batch conditions used 2 grams of oil and 8 grams of methanol at 300°C for 2 hours. A new supercritical flow reactor is being developed to obtain kinetic data and our preliminary findings will be discussed.

Whitaker, K.R. LSU-A. M.D. Ediger. UW-M. **Calorimetric study of ultrastable vapor-deposited glasses of decalin.—**Amorphous solids, or glasses, are solids that lack long range order in their structure. Glasses are also non-equilibrium materials with properties that depend on the conditions under which they were prepared. Over the last decade, it has been demonstrated that physical vapor deposition can be used to prepare glasses with extraordinary stability. Here, the reversing heat capacity of vapor-deposited glasses of decalin was measured using in situ AC nanocalorimetry. Glasses of cis-decalin and several cis/trans-decalin mixtures were observed to have low heat capacity and high kinetic stability, as compared to the corresponding liquid-cooled glass. The heat capacities of the vapor-deposited glasses of cis-decalin and the 50/50 cis/trans-decalin mixture were up to 4.5% lower than that of the liquid-cooled glasses. The 50/50 mixture also exhibited a high kinetic stability; the transformation time of a ~500 nm film deposited at 116 K (0.86 Tg) was equivalent to $10^{4.4}$ times the structural relaxation time of the supercooled liquid at the annealing temperature. The 50/50 cis/trans-decalin mixture is the highest fragility material and also the first molecular mixture reported to show ultrastable glass formation.

White, D.R. and C.C. Huval. LSU-E. **NAPL binders: Swelling properties of natural materials.—**The first response to chemical spills is removal and containment of contaminants. This project focused on materials for removal and containment of non-aqueous phase liquid (NAPL) contaminants from water. If NAPLs are more effectively cleaned up immediately during the emergency phase, issues of remediation of NAPLs can be lessened. Some requirements for an NAPL absorption material are: ability to treat large areas, non-hazardous, readily available, high NAPL capacity (pickup), low water capacity (selectivity), and readily separable (recovery).

The saturated water and oil swelling properties (≥24 h, filtered) were obtained for ~50 environmentally friendly materials. Some results: psyllium 21.26 g water/g , 0 g oil/g, 0 g oil/g water; oil dry clay (commercial oil absorbent) 0.78 g water/g, 0.44 g oil/g, 0.56 g oil/g water; human hair 3.34 g water/g, 8.92 g oil/g, 2.7 g oil/g water; and cotton balls 7.32 g water/g, 13.15 g oil/g, 1.8 g oil/g water. Among the materials evaluated, waterfowl feathers stood out: they had swelling capacities 3.39 g water/g and 18.94 g oil/g and had an oil-to-water swelling selectivity of 5.6 g oil/g water. Supported by LSU Eunice URSI 2013 and 2013-2014 Train Derailment Endowed Professorship.

Computer Science Section

Blouin, C.D., and M.A. Salam. SU-BR. **The use of computer modeling to monitor energy consumption.—**Computer modeling plays a very important aspect in today's society as it relates to monitoring energy consumption. With the growing energy problems facing many colleges and universities within the United States, the need for a long-term sustainable energy solution is inevitable. Through the use of energy consumption monitoring systems, we are now able to efficiently and effectively track and monitor energy consumption. This paper discusses and compares two computer modeling and simulation techniques currently being implemented at United States colleges and universities as energy consumption monitoring systems: DOE-2 and Energy-10. DOE-2 is a FORTRAN based computer program that predicts energy use and building costs based on the weather, HVAC equipment and utility rate structure. Energy-10 is a PC-based building energy simulation program that focuses on early stage architectural design and sustainable integration and implementations. This paper also describes how the implementation of such a monitoring system at any colleges or universities can help create a long-term sustainable energy solution and lower future energy costs. Performed under the Historically Black College & Universities Undergraduate Program Achieving Competitive Excellence Project, administered by the Office of Research and Strategic Initiatives at Southern University and A&M College Baton Rouge, funded by the National Science Foundation.

Elashhab, H.M. and M.A. Salam. SU-BR. **Analysis of compression algorithms in wireless sensor networks.—**Wireless sensor networks are known for consuming energy considerably, and the continual need to utilize limited bandwidth to absorb most of the packets in the medium has led to a great deal of research in the field of data compression. Wireless sensor networks have been exploited to balance the maintenance of readable information content with acceptable error when extracted at the base station and the cost of energy consumed by the collecting nodes during the compression operation. Wireless sensor networks are low-power networks; they consist of a number of wireless sensors that last for a long time due to the rate of power consumption built into the battery design. We studied both JPEG compression and watermarking systems, applied both compression techniques, and used error measurement to indicate system performance regardless of the number of execution instructions. The findings state that it is not enough to use error measurement only and that the number of executing instructions also must be considered. The digital watermark approach showed a lower average error than the JPEG approach. However, there were fewer instructions in the JPEG approach than in the watermark approach.

Lambert, D., S. Holmes, K.A. Warrington, and Y.B. Reddy. GSU. **Cost and time efficient internet car sales.—**An intranet is a computer network that uses Internet Protocol technology to share information, operational systems, or computing services within an organization. Sometimes, the term refers only to the organization's internal website, but may be a more extensive part of the organization's information technology infrastructure, and may be composed of multiple local area networks. The objective is to organize each individual's desktop with minimal cost, time and effort to be more productive, cost efficient, timely, and competitive. This website is used for the employees of one of the world's top selling car company, Honda (Development and Business IT). Business IT is the application of computers and telecommunications equipment to store, retrieve, transmit and manipulate data in dealings with a business. The website is designed to make it easier for the employees by having one location where they are able to check their schedule to review the latest sales report. The only people who can access this website are employees of the company. User will have to register for a login, if one is not already created for them. Also username and password is of the user's choice. The manager is the only person who has admin right to the website. This means he/she is the only person who is allowed to update certain information into the database. The website is created in java script and HTML. We also use the website Wordpress for installation. The Eclipse was used to create the database and to start the development of the site. When it was time to start creating the site, Wordpress was used. The group is still in the stage of adding all the features/plug-ins to the site. We want the site to be user friendly as much as possible.

Reddy, Y.B. GSU. **Cloud environment on cognitive radio network for efficient resource allocation.—**Cognitive radio is a promising technology for efficient utilization of unused spectrum. The primary function of cognitive radio networks is their ability to scan the entire spectrum band to detect the presence/absence of primary (licensed) users. The detection of the primary user is called spectrum sensing. The detection and analysis help to identify the spectrum holes to utilize by secondary users. The basic characteristics to determine the appropriate band is the signal-to-noise ratio, link error rate, delays, interference, and holding time. The processing of this information takes a lot of computational resources including hardware and energy consumption. If we can create a virtual environment called cloud for signal sensing, network management, efficient utilization of spectrum holes, the mobile devices will be benefited in eliminating the overheads for packet transfer and improving the battery life. Cloud environment on cognitive radio is a combination of cloud and mobile technologies. The goal is to support mobile applications more efficiently to utilize bandwidth, energy consumption, hardware utilization and cost. Cloud is a virtualization concept (borrowed from the virtual machine environment introduced in the 1970's) in wireless communications to utilize resources efficiently and provide quality of service. The new cloud architecture for cognitive radio solves the 4G bottlenecks including current spectrum shortage, improving data storage capacity and processing power, better network management, and minimizing energy consumption. The objective of the talk is to provide information on the cognitive virtualization platform, network architecture, performance analysis, and management issues.

Saint-Jean, D., O. Olaotan, and Y.B. Reddy. GSU. **ProFit Plus.—**This application will be used for fitness and exercise tracking. This application is designed to meet the needs of all users who need a comprehensive solution to fitness and exercise. The mobile applications targeting fitness that are currently available mostly do one or two things that being count calories, provide

exercise suggestions, or meal recommendations. These applications, while good, are unable to provide the comprehensive suggestions and analysis that we will be providing through ProFit Plus. This application focused on three main areas: (1) provide exercise recommendation to the user, (2) dynamically track and record progress and (3) monitor caloric intake. The only people who will be using the system are the end users who install the application onto their mobile devices. The package is ready to use for the end-users.

Salam, M.A. and T.K. Sarkar. SU-BR. **A new approach towards the trust evaluation of wireless sensor networks.—**Reliability and trustworthiness of wireless sensor networks (WSN) are an important factor to derive appropriate inferences from the collected data. Retrieving this sensitive data in a secure, reliable, and efficient manner is an essential building block for various futuristic applications. There are many trust models available for WSN. The trusts for all these models, comes in turn from the reputations that are essentially based on the theory of posterior probability. This paper establishes the similarity of the practice in Human Resource (HR) Performance Appraisal models to evaluate trust in a node. Using the HR review model, where judgments from reporting staff to higher-up management is counted along with peer-to-peer reviews before arriving at a final figure for evaluation, the proposed model calculates trust or the performance picture of a node from its neighboring node plus judgments from its cluster-heads along with the evaluation from its base-station. Like HR performance appraisal models can be different depending on the roles performed by an employee within the organization, this paper suggests that the performance data can be used to establish trust in different hierarchical models of wireless sensor networks.

Shrestha, A., G. Spears, and Y. B. Reddy., GSU. **The ClassMate App.—**This project is designed from the idea that students sometimes need to cut down on time spent planning and executing group project meetings, and late night congregations in which to exchange or relay information and class updates to all group members. This prompted us to work on an android based app called ClassMate App. The app will be designed to perform functions such as enabling users to update class activities for the classes in which they are enrolled, taking class notes that can be shared with other group members and access notes taken by other classmates. The app also enables users to view/edit the list of other students who are enrolled in the class.

Small C., A. Shrestha, O. Olaotan, G. St. Croix, and J. Mesit. GSU. **Scrawler: A hybrid of Snake and Scrabble.—**Nowadays many games are available for entertaining and learning purposes. In this project we present the game called Scrawler 3D which enables us to learn the programming language and how the codes can be used to create and manipulate visual information. Scrawler 3D combines elements of two games, ‘Snake’ and ‘Scrabble’. Snake is a classic game where the player controls a snake and moves it towards the food and each time the snake passes over the food, it grows. In scrabble, the player has to make words out of letters that are on randomly picked tiles. Scrawler 3D will move the snake using up, down, left and right arrow keys and the second being eating the randomly placed letters to make a word. Some essential elements of the game are game board, a snake, letters and score tracking. Once the user makes a valid word, the score is added and the letters will be placed back on the board in random locations. We eventually plan to apply textures on the object and make the snake look more realistic. We also are planning to add more game modes and difficulty levels so the game will not seem repetitive.

Small, C., I. Marsh, and Y.B. Reddy. GSU. **Linked website.—**Linked was built to make web browsing more convenient and faster. Most people use common sites every day and many of those people revisit those sites. Speed in web browsing is a major factor for which Linked can help. Why search for a page that you already know when you can use Linked as your home page and have the sites that you use on a daily basis right there and are just one click away. You also can add and delete sites at your own will. Linked uses user input and URL saves to save pages that the user enters. Then if you want to delete one of your sites there is a button for that. Linked was built with html5 which gives it even more room to be updated. There were less problems using Linked Website during user feedback. The presentation provides the implementation of Linked Website and its benefits for its customers.

Smith, Y., and Y.B. Reddy. GSU. **Cloud computing and applications.—**Cloud computing is internet based computing, where shared resources, software and information are provided to computers and other devices on demand. Elasticity and scalability are used to help cloud services scale up to meet a demand or scale down when higher demand is not required. Virtualization is another strong suit in cloud computing, that involves a shift in thinking from physical to logical. With virtualization you can consolidate several resources into virtual environment processors, storage, and networks. The main advantage of virtualization in cloud computing is that software is decoupled from the hardware. The National Institute of Standards and Technology describes four cloud deployment types: public, private, hybrid, and community. The public cloud service provider lets clients access the cloud via the internet. The private cloud infrastructure is used solely by the organization that owns it. The hybrid cloud is actually composed of two or more clouds (private, public, or community) they remain unique entities, and they can interoperate using standard or proprietary protocols. The community cloud is shared by several organizations that have a common mission. Private clouds offer secure, dedicated infrastructure, and the user can buy or lease the cloud. Hybrid clouds allow applications and data to flow across clouds, requires interoperability, visibility, and management, and also supports a very flexible performance model. In this presentation, we will present cloud models, current status, and future of cloud technology.

Earth Sciences Section

Kreller, S.J. and L.H. Hopper, Jr.. ULM. **Which hurricane attributes are most strongly correlated with maximum storm surge height?—**Storm surge causes the most fatalities and property damage in hurricanes, so predicting what types of hurricanes cause the strongest surge is important. This project correlates storm surge height with many attributes of landfalling U.S. hurricanes between 1950 and 2012, including maximum and landfalling wind speed, maximum and landfalling sea level pressure, and various shape and size parameters. Storm surge data were obtained from Louisiana State University's "SURGEDAT" database and the maximum wind speed and minimum sea level pressure at landfall and any point during the storm were determined using the NOAA HURDAT database. In addition, wind field shapefiles available for all hurricanes since 2003 and some historical storms were gathered from the NOAA Atlantic, Oceanographic, and Meteorological Laboratories (AOML) site and analyzed using GIS software. The diameter, circumference, area, and symmetry of wind speed thresholds at landfall based on categories of the Saffir-Simpson Hurricane Wind Scale (i.e., tropical storms and category 1, 2, 3,

4, and 5 hurricanes) are investigated for each storm that has GIS shapefiles to determine if they exhibit stronger correlations than wind speed or minimum pressure. Future research will evaluate the depth of convection and angle of the hurricane to the coast at landfall.

Viramontez, A.G. and L.J. Hopper. ULM. Variations **in raindrop size distributions associated with diverse storm types and structures.—**Heavy rainfall is produced by a variety of frontal and non-frontal storm types in northeast Louisiana, a subtropical region affected by midlatitude and tropical influences. These storm types produce a variety of raindrop size distributions (DSD) reflecting the different large scale influences impacting northeast Louisiana. Quantitative precipitation estimates derived from Z-R algorithms that diagnose rain rates from radar reflectivity rely heavily on DSD relationships and may overestimate or underestimate observed rainfall totals. Therefore, the primary objective of this study is to quantify microphysical variations in raindrop size distribution (DSD) associated with different storm types and structures using a laser-optical Parsivel-2 disdrometer. Storms will be classified based on their large scale forcing (e.g., cold front, warm front, upper level disturbance, etc.). Variations in DSDs will be analyzed using these storm classifications to determine how DSDs anomalies observed by the Parsivel-2 disdrometer vary by storm type, with comparison to those observed by a (JW) RD-80 impact disdrometer located in southeast Texas, if time permits. Collocated rain gauges and anemometers also will be used to determine the reliability of optical disdrometer measurements in various rainfall rates and wind conditions. Supported by NSF EPSCoR SURE Program administered by LA BoR.

Materials Science and Engineering Section

Sharma, A., J. Melancon, C. Zellhofer, and S. Zivanovic. LTU. **Experimental optimization of polymer solar cell with P3HT:PCBM active layer.—**Poly(3-hexylthiophene):[6,6]-phenyl-C61-butyric acid methyl ester (P3HT:PCBM) blend is known for its wide use in the photovoltaic applications due to its low device processing cost, material flexibility, and light weight. We experimentally investigated the influence of the thickness and concentration of the P3HT:PCBM blend layer on the solar cell performance. Device structure used in the experiment consists of glass/ITO/PEDOT:PSS/P3HT:PCBM/Al, where ITO and PEDOT:PSS stand for indium tin oxide and poly(3,4-ethylenedioxythiophene):poly(styrenesulfonate), respectively. Chlorobenzene was used as a solvent. Spin coating technique was used to deposit active layer and by varying coating speed, thickness of active layer was achieved in a wide range from 20 nm to 345 nm. The PEDOT:PSS was used as hole transport layer at the interface of ITO and active polymer layer in order to extract photo generated holes efficiently towards the ITO electrode. It was observed that the morphology of PEDOT:PSS layer has significant impact on the performance of solar cell. The series resistance and power conversion efficiency were noticed to increase with the thickness of active layer; however, the fill factor and the open circuit voltages remained almost the same. Presented results are helpful for the future design of the efficient polymer solar cells.

Brown, J.B. and P.A. Derosa. LTU. **Charge transport behavior in CNT composites.—**Charge transportation in non-overlapping CNT composite samples is examined using the Miller and Abrahams approach. A series of samples are first generated using a robust Monte Carlo code and a series of parameters. These parameters have been and are currently being developed to model

the composition effects of different fabrication processes by considering CNT aspect ratio distribution, tortuosity, alignment, disorder and agglomeration. Simulations have been run to calculate the mobility carrier concentration and conductivity of these materials. The modeled CNT composites exhibit characteristic percolation behavior. A two dimensional model also has been created for the purpose of clearly showing the mechanisms governing charge transport in such materials.

Jiang, Z.C., T.D. Nance, K.R. Minter, and S. Lee. GSU. **A home security system design.—**Home security systems have always been in high demand for safety reasons. The objective of this project is to design a cohesive system with four different detecting devices which are networked logically. The electric/electronic components used to build these sensors include BISS001 IC chip, RE46C190 IC chip, Fresnel lens, thermistor, photoresistor, and other resistive and reactive components. Logic Gates, 555 Timer, transistors, relays and audio/visual alarms are utilized for signal processing and system outputs. This security system has 3 modes: Home, Off, and Away. Home mode deactivates the motion sensor to allow the resident moving freely at home, Off mode deactivates all the sensors and Away mode activates all the sensors. The National Instruments Circuit Design Suite 12.0 was used to simulate, analyze, and troubleshoot this system. A prototype of the designed circuit was constructed on a breadboard and its performance was demonstrated experimentally. This system can be easily extended/expanded to include more input sensors and output devices for other security applications.

Dean, J., A. Merille, and N.V. Seetala. GSU. R. Li and K.M. Dooley. LSU-BR. **Positron lifetime and magnetization studies of rare earth oxides as desulfurization adsorbents.—** Rare earth oxide (REOs) nanoparticle catalysts are used as desulfurization adsorbents. The nanoporosity of these catalysts may influence the diffusion characteristics of the desulfurization absorption efficiencies. We used PALS to study the nanoporosity of metal oxide nanoparticle catalysts with Mn, Al, Ce, La, Fe, and Gd metal compositions. The third lifetime component provides the information on pore size (lifetimes) and concentration of pores (intensities). The PALS results indicate that Al rich catalysts have larger nanopores with lesser concentration and higher fractional free volume (1.5 to 2 times) compared to all other REO catalysts without Al. Bulk Mn is mostly paramagnetic, but it shows ferromagnetic character when a thin film is coated on semiconductors/metals even though the interacting metal is nonmagnetic. The exchange interaction at the interface provides ferromagnetism for Mn. Here, we study the magnetic character for Mn/REOs with different compositions. The magnetic curves consisted of paramagnetic and ferromagnetic components. The ferromagnetic character is presumed to be mainly coming from the exchange interaction at the interface for Mn with other oxides. The saturation magnetization follows the order of Mn composition in these Mn/REO catalysts. This work is partly supported by DOE-EFRC and LA-SiGMA grants.

Galib, M., A. Radadia, A. Sharma, and S. Zivanovic. LTU. **Experimental investigation of bilayer graphene transparent electrode in the application of photovoltaic cell.—**Bilayer graphene (BLG), has become a good substitute for indium tin oxide (ITO) that is widely used as transparent electrode in photovoltaic (PV) cells. BLG, due to its high transparency, electrical conductivity, and mechanical stability, has become a strong candidate for optoelectronic applications. We have used BLG as an electrode in the fabrication of novel poly (3-hexylthiophene): 1-(3-methoxycarbonyl) propyl-1-phenyl-[6,6]-methanofullerene (P3HT:

PCBM) bulk heterojunction PV cell. BLG was synthesized on copper by CVD method and was transferred on quartz substrate, but BLG comes with high sheet resistance. To overcome the sheet resistance, uniform gold nanoparticles were deposited by p-doping. After the fabrication of BLG/PEDOT:PSS/P3HT:PCBM/Al photovoltaic device, the PV cell was characterized. A short-circuit current of 0.027mA/cm^2 and an open circuit voltage of 0.586 V were achieved under the 100mW/cm^2 white light illumination. Power conversion efficiency (PCE) 0.0025% was achieved under AM1.5G conditions. The process of fabricating the graphene based PV cell has been presented. Also, the procedure used to transfer the CVD grown graphene on the quartz for making of the PV cell has been demonstrated. The device was tested in air, which might have degraded the polymer, resulting in poor performance of the PV cell.

Tull-Walker, N. and N. Seetala. GSU. A. Baburaj. PVAMU. **Irradiation effects of ultra-high molecular weight polyethylene and composites made of Martian regolith studied by PALS.—**We use positron lifetime spectroscopy to study the nanoporosity and fractional free volume in ultra-high molecular weight polyethylene (UHMWPE) and composites made of Martian regolith (UHMWPE-MR) as-made and irradiated to three different doses (10, 32, 64 Gy) to understand the effect of irradiation on the microstructure and its correlation with the mechanical properties. The positron lifetime spectra were analyzed using POSFIT program and obtained two lifetime components for all samples. First short lifetime component around 0.28 ns is related to positron annihilation in material including vacancy defects and the second long lived component around 1.7 ns is due to Positronium formation in free volume pores. The results indicate that UHMWPE-MR composite is less porous compared to UHMWPE polymer. The UHMWPE-MR composite has lesser concentration compared to UHMWPE and the average size of the nanopores is around 0.5 nm. Larger variations in positron lifetime parameters are observed with increasing irradiation dose for UHMWPE polymer compared to UHMWPE+MR composite, the tensile test results also showed larger variations with increasing irradiation dose for UHMWPE polymer. At low irradiation doses, small vacancy defects were observed, while the vacancy defects aggregate to form pores at higher doses. Work partly supported by NASA grant.

Physics Section

Elumalai, D. LTU. P. Derosa. LTU & GSU. **Simulation of the controlled release of molecular species from multi-walled nanotubes.—**Nanotubes show exceptional properties that make them promising candidates for applications that require the transport or the storage of fluids, molecules and nanoparticles. Encapsulation and the controlled release of active agents have long been investigated and exploited to develop efficient delivery vehicles for drugs, nutrients, and cosmetics and protective agents. Recent advances in nano-fluidics and other techniques have inspired the design of new carriers/vessels that efficiently encapsulate active agents and enable their on-demand release. However, it is difficult to predict the diffusion and flow in these systems numerically since the standard models used in the macro regime break down at these scales, while the computational times of applicable molecular-dynamics codes become exorbitant. Here, a simulation model that elaborates diffusion through and from such carriers/vessels and enables efficient encapsulation and controlled release for various applications is described. A three-dimensional time quantified Monte Carlo model is developed to efficiently predict the overall diffusion characteristics up to the transition regime for

reasonably high Knudsen number nanotubes. Presented results are comparable to experimental data published in the literature. The solutions also are validated with published experimental data.

Hart, D,R. SU-BR. **A correlative study of mm-wave and gamma-ray measurements from selected high-energy sources.—**This is a report on correlative millimeter-wave radio observations at 1.1 mm of high-priority Fermi-detected gamma-ray blazars using the AzTEC bolometer array camera mounted on the 10-m ASTE radio telescope in northern Chile. These observations were carried out during the latter part of the 2008 observing season, overlapping with the first months of operation of the Fermi Observatory. High-priority blazars were monitored and were responded to as well to Fermi alerts of elevated gamma-ray emission or flaring activity. There are also reports on the upper limits obtained to millimeter-wave emission in the early afterglow from GRB 081121. These correlative measurements constituted a pilot observing program that will be extended and expanded to include numerous additional gamma-ray targets for the Large Millimeter Telescope as part of its commissioning operations over the coming years. The mm-wave results of Blazar A0 235+164 were correlatively studied utilizing our software to calculate its discrete correlation functions values. These results show high positive flux correlation with a minimal lag time of 2.5 day.

Ifeanyi, H., Y. Nwigboji, L. Malozovsky, B. Franklin, J. Khamala, D. Ejembi and D. Bagayoko. SU-BR. **Ab-initio calculations of accurate electronic properties of aluminum nitride.—**We present results from ab-initio, self-consistent local density approximation (LDA) calculations of electronic and related properties of wurtzite aluminum nitride (w-AlN). Our non-relativistic computations employed the Ceperley and Alder LDA potential and the linear combination of atomic orbital (LCAO) formalism. The implementation of the LCAO formalism followed the Bagayoko, Zhao, and Williams' method as enhanced by Ekuma and Franklin (BZW-EF). The BZW-EF method verifiably obtains the minima of the occupied energies; these minima provide the most variationally and physically valid density functional theory (DFT) description of the ground states of materials under study. Our preliminary results for w-AlN show that w-AlN has a direct band gap of 5.82 eV at the Γ point. We also discuss our calculated density of states (DOS) and partial densities of states (pDOS). This research is funded in part by the National Science Foundation (NSF) and the Louisiana Board of Regents, through LASiGMA [Award Nos. EPS-1003897, NSF (2010-15)-RII-SUBR] and NSF HRD-1002541, the US Department of Energy-National, Nuclear Security Administration (NNSA) (Award No. DE-NA0001861), LaSPACE, and LONI-SUBR.

J.I. Ejembi, L. Franklin, Y. Malozovsky and D. Bagayoko. SU-BR. **Ab-initio calculations of electronic properties of boron phosphide (BP).—**We present results from ab-initio, self-consistent local density approximation (LDA) calculations of electronic and related properties of zinc blende boron phosphide (zb-BP). We employed a local density approximation (LDA) potential and implemented the linear combination of atomic orbitals (LCAO) formalism. This implementation followed the Bagayoko, Zhao, and Williams (BZW) method, as enhanced by the work of Ekuma and Franklin. Our results include electronic energy bands, densities of states, and effective masses. The calculated band gap of 2.01eV, for the room temperature lattice constant of a = 4.5383 Å, is in excellent agreement with experimental value of 2.00eV.

Khamala, B.O., A. Stewart, F. Loushanda, Y. Malozovsky, and D. Bagayoko. SU-BR. **Calculated electronic transport and bulk property of cubic zinc sulphide.—**We present the results from ab-initio, self-consistent, local density approximation (LDA) calculations of the electronic transport and related properties of zinc-blende zinc sulphide (zb-ZnS). We employed the Ceperley and Alder LDA potential and the linear combination of atomic orbital (LCAO) formalism in our non-relativistic computations. The implementation of the LCAO formalism followed the Bagayoko, Zhao, and Williams method as enhanced by Ekuma and Franklin (BZW-EF). The BZW-EF method includes a methodical search for the optimal basis set that yields the minima of the occupied energies. This search entails increasing the size of the basis set and related modifications of angular symmetry and of radial orbitals. Our calculated, direct gap of 3.725 eV, at the Γ point, is in excellent agreement with the experiment. We also have calculated the total (DOS) and partial (pDOS) densities of states, electron and hole effective masses and bulk modulus that agree very well with available, corresponding experimental results. This research is funded in part by the National Science Foundation (NSF) and the Louisiana Board of Regents, through LASiGMA [Award Nos. EPS-1003897, NSF (2010-15)-RII-SUBR] and NSF HRD-1002541, the US Department of Energy-National, Nuclear Security Administration (NNSA) (Award No. DE-NA0001861), LaSPACE, and LONI-SUBR.

Lama, N., D. Norwood and J. Vercellotti. SU-BR. **Static light scattering of yeast phytoglycogen.—**In the presentation, we will describe the use of a multi-detector HPLC incorporating the DAWN EOS multi-angle laser light scattering (MALLS) detector to measure the properties of the yeast phytoglycogen. Yeast phytoglycogen which has many applications is used in baking, making beer and wine as well as in making cosmetics. In the experiments which were a part of basic science research findings, we determined the quality of the samples of yeast phytoglycogen by analyzing its various properties such as molecular weight, RMS radius, contour and persistence length and polydispersity. Data and results obtained from the experiment will be presented.

Stewart, A.D., B. Khamala, D. Hart, Y. Malozovsky, and D. Bagayoko. SU-BR. **Ab-Initio calculations of the electronic and related properties of boron nitride.—**The potential of boron nitride (BN) in nanotechnology is tremendous. Nanostructures of BN have structures and properties similar to those of CNTs (i.e. graphene sheets rolled onto themselves) and can be synthesized by similar methods (i.e. exfoliation). BN in its bulk form has a wide band gap with excellent thermal and chemical stability. BN nanostructures can be tailored using various techniques in order to obtain desired material properties. The state-of-the-art Proton Exchange Membrane Fuel Cell (PEMFCs) technology exploits graphitized carbon as a support for platinum-type catalysts. However, some forms of carbon are susceptible to long-term durability issues such as corrosion which is a detriment to fuel cell performance and viability. Novel non-carbon supports such as BN may provide a pathway for addressing the durability and performance issues associated with carbon support materials. We present theoretical studies of electronic and related properties, using an LCAO package from Ames Laboratory, of this potentially important material. Our calculated band gap of 6.48 eV for the cubic structure, using LDA potential and the BZW-EF method, is in excellent agreement with the experiment.

Y. Malozovsky, A. Saliev, L. Franklin, E. C. Ekuma, G. L. Zhao, and D. Bagayoko. SU-BR. **Ab-initio calculations of electronic properties of AlP, InP and GaP.—**We present results from

ab-initio, self-consistent local density approximation (LDA) calculations of electronic and related properties of zinc blende aluminum, gallium and indium phosphides (AlP, GaP & InP). We employed an LDA potential and implemented the linear combination of atomic orbitals (LCAO) formalism. This implementation followed the Bagayoko, Zhao, and Williams (BZW) method, as enhanced by Ekuma and Franklin (BZW-EF). Our calculated, indirect band gap of 2.56 eV for AlP, and of 2.28 eV for GaP, from Γ to X, are in excellent agreement with experimental values. Our calculated direct band gap of 1.40 eV, at Γ-point for InP is also in excellent agreement with the experimental value. We report calculated electron and hole effective masses for AlP, GaP and InP and total (DOS) and partial (pDOS) densities of states. This research is funded in part by the National Science Foundation (NSF) and the Louisiana Board of Regents, through LASiGMA [Award Nos. EPS-1003897, NSF (2010-15)-RII-SUBR] and NSF HRD-1002541, the US Department of Energy-National, Nuclear Security Administration (NNSA) (Award No. DE-NA0001861), LaSPACE, and LONI-SUBR.

Division of Science Education

Higher Education Section

Pugh, A., R. Mann, T. Allen, D. Schween, and S. Jennings. ULM. **Attitudes of professional block students for the areas of science and mathematics four consecutive semesters as ascertained by a longitudinal questionnaire.—**For the three semesters prior to student teaching all elementary education majors are required to complete courses in methods of which the first one is in lower reading, the second in upper reading, and the third is a combination of lower mathematics, upper mathematics, science, and social studies. These courses are conventional for the current CCSS and mandatory for completion of requirements before attaining a degree in Elementary Education. At the conclusion of the third courses in methods, a survey is administered after the students have received their grades for the course. Therefore, the purpose of this study was to ascertain the attitudes of how students believed to be prepared in the areas of science and mathematics for four semesters of Spring 2012 through Fall 2013. Preliminary results indicated positive results for both courses in science and mathematics. The highest percentage was 88% with the lowest being 19%. Factors attributing to this wide span could be related to the size of classes, requirements, or individual preferences toward the subjects.

Division of Sciences and Humanities

Alexander, R.A. and R.R. Giguette. NiSU. **"After all, it's only a theory": Addressing false equivalency in introductory courses in the sciences and humanities.—**Whether one is teaching an introductory course in the humanities or the sciences, one of the great challenges facing the instructor is to facilitate student learning of key ideas and concepts, and such learning depends significantly on clarification of terms. Many beginning students come into our classes with a rich and often bewildering assortment of assumptions and misunderstandings that can stifle their ability to learn. One such misunderstanding that is especially problematic involves the misapplication of the word "theory," which may lead students to draw a false equivalency between what has been proven to be empirically probable and what is nothing more than a guess. Our presentation examines why students are led to make this fundamental error of equating "theory" as it is applied in science with variations of the term used in other contexts and how this mistake may limit or entirely derail these students' educational progress in courses in both the sciences and humanities. We also will discuss what instructors can do to address this problem in a way that underscores the importance of clarity while also respecting the diverse experiences that may have led these students to embrace this false equivalency.

Doucet, J. NiSU. **Assessing the Great October Storm of 1893: Histories informing sciences. —**After 120 years, the Great October Storm of 1893 remains the second deadliest natural disaster in U.S. History. Despite this mortality, however, it also remains one of the least known. The hurricane struck the Louisiana Gulf Coast at Chênière Caminada, once a densely populated fishing village just northwest of the state's only inhabited barrier island, Grand Isle. On the night of October 1st, the storm destroyed half the village's population of 1500, nearly all the homes, and the entire fishing fleet. Before the hurricane exited the continent at the Carolinas three days later, it took 2000 lives, nearly all from the Gulf Coast. Survivors of the storm at Chênière Caminada founded the current day community pattern surrounding Barataria Bay and across southeastern Louisiana. Largely absent from state and national literature over the ensuing century, recognition of the storm was maintained across generations through the oral tradition and by extended families. Modern day scientific assessment of the hurricane and its social impact has succeeded due to the availability of these scant oral histories, as well as extensive genealogies and reporting in New Orleans newspapers. Our technical understanding of this once long-forgotten event is a classic example of the importance of humanities to the sciences.

LaFleur, Jr., G. NiSU. **Using humanities to nurture biophilia in Louisiana students from kindergarten to graduate school.—**The concept of biophilia is often absent from the science textbooks that I use. E.O. Wilson defined biophilia as the tendency of humans to love living things. I present some strategies that I have found useful in nurturing biophilia in Louisiana students. I have had success getting elementary school students thinking scientifically by bringing fiddler crabs into their classroom. Whether there are more right-handed or left-handed crabs usually gets asked. This leads to ideas on how one might test this hypothesis, and a lesson on the scientific method ensues. Fiddler crabs can also exemplify how even small creatures play big roles in a complex ecological consortium. With college students, having everyone compose a haiku after a field trip, or after discussion of a scientific article, somehow leads to a deeper appreciation for the science. Before endocrine experiments, I often have the students sketch fiddler crabs, to emphasize the eyestalks, and sexually dimorphic characters. Showing films such

as Miyazaki's “Princess Mononoke” have allowed me to introduce the concept of land ethic, in an easy to digest format. I am not adding biophilia to my syllabus topics, but rather trying to instill it in my students through constant gardening.

Division of Social Sciences

Adams, O.A., and L.B. Lewis. LU-NO. **The effects of agency and communal motives on memory and perception and their relationship to sex and gender-linked traits.—**Existing research has suggested that there are two broad and contrasting concepts that govern and organize human lives. While labeled differently with such terms as individualism and collectivism, dominance and submissiveness, assertive and accommodating, the prevailing terms are agency and communion. This research explores the broader concepts of agency and communion to examine the role they play between genders and how they affect personal memory. It is hypothesized that people exhibiting feminine identities will remember and identify things with communal aspects more than males because their social roles afford them communal traits. In contrast, people exhibiting masculine identities will remember and identify things with agency or individualistic aspects because socially, they have greater individualistic traits than females. Results from sex-role assessments and tasks of agency and communal traits will be collected from 120 Loyola students. Male and female participants will be assigned to agency, communal, and neutral primed and unprimed groups. Participants in each group will complete tasks of autobiographical memory and perception to examine relationships between gender, gender-linked traits, and individual or agency versus communal style performance. The results will be scored and coded, and differences between the groups will be tested with analyses of variance (ANOVA).

Allenbach, K.N. and L.B. Lewis. LU-NO. **The effects of gender, gender role conformity, and sexual orientation on linguistic ability and social communication style.—**The focus of this research is how individuals' genetic sex, gender-role conformity, and sexual orientation affects performance on cognitive tasks assessing verbal/language skills, and the way in which gender and gender-role conformity may influence social communication style. Participants will be Loyola University New Orleans undergraduates. Participants' sexual orientations will be assessed using the Kinsey Scale, while participants' gender-role conformity will be assessed using the Personal Attributes Questionnaire. Cognitive factors will be assessed using a verbal fluency task and an analogy task designed by the principle investigator. Social/Communication style factors will be assessed using the Communication Style Inventory. By assessing the effects that gender, sexual orientation, and gender-role conformity have on cognition and communication, we will be able to draw conclusions about the relative biological and social aspects on gender and sexual orientation, a current topic of much contention in the realm of research on sexual orientation and gender studies. Focusing on language, both cognitive and social aspects of language, will allow examination of the factors that may influence people's language abilities and differences in interpersonal communication style.

Yehya, R.M. SU-BR. **Dropping Out of School: The Persisting Challenge.—**Dropping out of school continues to be a social and educational challenge, with significant consequences for the dropouts and American society. Dropouts are more likely to be unemployed, commit crimes, receive public assistance, and be incarcerated; and less likely to have pension plans, health insurance, and good health. Dropouts also have shorter life expectancy, as compared to those who graduated. This paper is a comprehensive review of the dropout problem, including its multitude of risk factors (individual, structural, school, and community), cost and consequences,

and prevention programs. Special attention is paid to the assessment of these programs, particularly their effectiveness, and associated public-policy recommendations.

Acknowledgement

The Abstract Editor would like to thank Caleb Ardizzone for his assistance in reformatting the above abstracts from the original submissions.